General Procedures

Signature Series Edition

The following document outlines the key principles used in erecting the Sprung Instant Structure. It is to be used in conjunction with the manpower & equipment guide provided by our Contracts department. This document is in no way a definitive guide to the erection of a Sprung Instant Structure.

The construction of a Sprung Instant Structure can be categorized into seven distinct operations. These are:

1. Layout & Assembly
2. Erect Frame
3. Installing Membrane Panels
4. Optional Insulation Package
5. Tension & Anchor
6. Close end
7. Options

The following pages will give you a basic idea of what is entailed for each general procedure. Equipment recommendations are listed for each operation. Refer to the appendix for notes regarding the specifics of the equipment.
Layout & Assembly

Bundled and crated components to be distributed around the job site in appropriate areas.

The aluminum beams, which form the substructure, will arrive on site in a condensed manner. These beams will be moved into position, one at a time, on to the pad where the structure is to be erected. They will be staged in a specific pattern which facilitates their assembly and subsequent erection with a crane. The crated components comprise all the smaller materials used to assemble the beams. Splice plates, fasteners, and base assemblies are all located amongst the crated materials. These will be used to assemble the individual beams into arches. Dunnage (wooden blocks) should be placed under the beams to ease the assembly operation.

Typical equipment required:
- Forklift
- Dunnage
- Electric power
- Hand Tools

This graphic (right) depicts the layout pattern generally used.

This graphic (left) depicts a typical Center arch.
Erecting the Substructure

This process begins with the erection of the first arch. While still on the ground, nylon and wire ropes are attached to this first arch in specific locations. These tie off ropes will support the first arch. Each arch is erected using a crane. Structures 70' wide and larger require a small spreader bar. It is recommended that only nylon straps be used for this operation to avoid damage to the aluminum arch, but the discretion lies with the company providing the crane. Position the base of the arch into its proper location and anchor. Tighten the tie off ropes. Put a little slack into the rigging and, using the tie off ropes, plumb the arch. On very large structures (100' wide and larger), it may be convenient to use a optical transit. Once the arch is plumb, disconnect the rigging and prepare to raise the second arch.

The second arch is raised into position approximately 15' from the first arch. This arch is connected to the first with spreaders (aluminum purlins). This second arch is then temporarily anchored to the foundation. Move on to the next arch. Each arch is erected in the same manner.

Typical equipment required:
- Electric power
- Crane c/w rigger
- 2 Manlifts
- Hand Tools
Installing the Membrane

This process begins once an adequate amount of the substructure has been erected (usually 100 linear feet). Each modular bay of the Sprung Structure receives one membrane panel. There are two main types of membrane; Center panels & End panels. These are packed rolled in the wooden crates. Each panel has a ½” nylon rope welded along the length of both edges. The Center panel is rectangular in shape, whereas the End panel is triangular.

Center panels are installed from the ground using an innovative procedure which involves electric winches. Six workers are required for this operation. Two workers guide the membrane into the integrated channel of the beam on the feeding side, two workers operate the winches on the opposite side, while the remaining two workers monitor the process at the structures apex. These winches are attached to the beam using the integrated bolt chase. The roped edge of the membrane is inserted into the chase and fed from the ground up. Once the membrane has been installed the workers then move on to the next bay. Two other workers follow behind this crew and vertically tension the membrane with a small hydraulic device (found in the Sprung Tool Kit). If your Sprung Structure is insulated it is a good idea to install the insulation retention system prior to installing the exterior membrane. This option is covered in the next section.

End panels are installed using the same principle. Two workers place themselves at the crown of the radius end on the inside. These two workers guide the membrane into the integrated channel while workers at the base operate the winches. End panels are typically only installed once the Center panels are complete.

Typical equipment required:
- Manlift
- Fall Arrest Gear
- Hand Tools / Winches

Close-up of the electric winch
Installing the membrane
Optional Insulation Package

Sprung Instant Structures can be fully insulated with a Formaldehyde Free, foil backed fiberglass blanket up to 8" thick. This insulation is encapsulated between two layers of architectural membrane providing an aesthetically pleasing finish, inside and out.

Prior to installing the exterior membrane the insulation retaining system should be installed. This system is comprised of poly-rope running vertically from the peak of the structure to the base. Once the poly-rope is installed the insulation is simply rolled into place. Once all insulation is in place the interior membrane is then installed using the same principle as the exterior (outlined in chapter 3).

Typical equipment required:
- Manlift
- Scissorlift
- Fall Arrest Gear
- Hand Tools

![Insulation poly-rope](image1)

![Insulation poly-rope](image2)

![Insulation being installed](image3)

![Foil backed insulation blanket](image4)
Tension & Anchor

The act of hydraulically tensioning the membrane.

Typically this procedure begins after the membrane has been installed into a few modular bays. The first step requires the membrane to be tensioned vertically along the roped edge. This is accomplished by attaching a special hydraulic pump (which is provided in Sprung’s Tool Kit) at base of the beam. At the same time workers are preparing the purlins on the inside of the structure, as well as removing any temporary foundation anchors that were installed. To laterally tension each modular bay the hydraulic pumps are attached to the purlins. Each purlin is tensioned approximately 5” to a predetermined point and secured by a bolt. The beams are then anchored into their final position.

Typical equipment required:
- 2 Manlifts
- Fall Arrest Gear
- Hand Tools

Workers tensioning the membrane

Close-up of hydraulic unit
Close End

The term “closing the end” refers to a sequence of tasks which complete the radius End module.

All the membrane panels in the End module, aside from one, are installed and tensioned. Wire ropes (tirfors) are spanned across the End bay that is left open. These wire ropes are tensioned until the bay has collapsed enough to insert the final membrane panel. The final membrane panel is then installed and tensioned. All the end beams are then anchored, and the End module is complete.

Typical equipment required:
- 2 Manlifts
- Fall Arrest Gear
- Hand Tools

Interior view of the end being “closed”  Exterior view of the end being “closed”
Options

Options can include, but not limited to, the following: hoods, vents, cargo doors, personnel doors, windows, graphics, perimeter flat bar, aircraft hanger doors, framed openings for HVAC, tunnels, lights, entrance canopies, architectural cap, etc..

Once the “shell” of the Structure has been complete, the crew will shift their focus on to completing the remaining options. The Technical Consultant will have select members of the crew begin work on the various options as soon as permitted by the erection schedule.
This photo details an End Sliding Cargo Door, two peak mounted whisper quiet vents, a base level exhaust louver, and a vestibule with a single personnel door & hood light.
Completing the Structure - The Walk Through

Once the Structure is complete, the Technical Consultant will ask the individual supervising the project to attend a “walk through”. The Technical Consultant will inform the Project Supervisor of all information relative to the Structure. He will answer all questions and concerns you may have. He will then issue a signed document that states the Sprung Structure has been erected within the strict guidelines established by Sprung Instant Structures.

The completed product
Appendix 1 - Equipment

Scissorlift: The size of the scissorlift depends on the size of structure to be constructed. Scaffolding could be used on smaller structures or where circumstances warrant. Our contracts department will recommend a specific size of lift.

Manlift: This lift is also known as a JLG, Snorkel, or Genie lift. Ideally you would want to avoid an articulating boom, and use a straight boom. Again, our Contracts department will recommend a specific size.

Crane: We will provide all the dimensions and weights of the articles the crane will be lifting. It will be the responsibility of your sub-contractor providing the crane to determine the recommended crane size and type. Typically a boom length of about 100’ is adequate. Structures 70’ and wider will require a spreader bar.

Forklift: The forklift will be used to off-load and move materials around on site. It is usually required only for the first few days of the project. If your structure is very large or work site is spread out you may wish to keep the forklift onsite for the duration of the project.

Air Compressor: This equipment is only required if your structure has an MR-1 or 2 earth anchor package, or in some situations, if the Structure has an insulation package. The compressor must have an output capacity of 120 psi.

Jack Hammer: An 90 lb jack hammer will be required if the above mentioned MR-1 or 2 package is required. The jack hammer will be attached to a drive rod (which we provide in the tool kit) and used to install the anchors.

Power Supply: You must provide a 110v power supply. If arranged in advance, it may be possible for Sprung Instant Structures to provide a portable generator for sites in remote locations. We are also able to provide our power tools fitted for 220v operation.

Dunnage: Blocks of wood. A good size to utilize is 4” x 4” x 24”. These will be used during the assembly phase at the beginning of the project.

Tools: We will provide all hand tools required to erect the structure.